METEOROLOGICAL OFFICE
26 NOV 1982
LIBRARY
128955

Note: This paper is not an official document. It is for information only and must not be quoted in any printed publication.

Agricultural Memorandum No 960

SPRAY OCCASIONS ANALYSIS: JUNE 1981 to JUNE 1982

by

E. SPACKMAN

Note: Comments or suggestions on this paper should be addressed to the author.

E. SPACKMAN
Principal Meteorological Officer

Meteorological Office
MAFF/ADAS
Block B, Government Buildings
Brooklands Avenue
Cambridge

October 1982

3 8078 0003 2822 1

SPRAY OCCASIONS ANALYSIS : JUNE 1981 TO JUNE 1982

E Spackman

Meteorological Office, MAFF/ADAS, Cambridge

Summary

This paper presents an analysis of spray occasions for the 1981/82 season based on meteorological data.

1. Introduction

In the 16th and 17th Herbicide Reviews, Dr R Adams developed criteria based on meteorological data designed to permit a comparison between spraying opportunities at different places and in different seasons. In the 18th Herbicide Review Messrs E Spackman and I Barrie extended the analysis to include data from 15 stations and to provide average values of the number of spray occasions and lower quart values (third worst year in 10) in order to assess the number of occasions expected to be experienced in the worst years.

The reader should refer to the 16th (1979) Herbicide Review for a discussion on the choice of criteria and application of the technique and to the 18th (1981) Review for the location of the stations used in this year's analysis and average numbers of spray occasions at the stations. The latter information is also given by Spackman and Barrie (1981).

2. Criteria

The criteria used to identify occasions likely to be suitable for spraying are unchanged from those used for 1979/80 and 1980/81.

For Low Ground Pressure (LGP) vehicles the count of 'spray occasions' is based on the following criteria:

a) Daylight, but not earlier than 0600 h or later than 2000 h GMT.

b) No precipitation at the time of observation, or in the preceding hour.

c) Windspeed less than or equal to 9 kts (about 10 mph) at the meteorological observing height of 10m.

d) Air Temperature greater than 1.0°C during spraying.

e) Air temperature greater than 7.0°C at some time during the day.

f) With the exception of (e) all criteria must be satisfied simultaneously for at least 5 successive hours. Thus any period of 5-9 hours would be classed as one suitable occasion.

If Conventional vehicles are considered a further criterion is introduced.

g) Days when the Soil Moisture Deficit (SMD) is less than 5 mm (bare soil model) are excluded.

There may also be sprayers which can safely operate in slightly higher winds. These will be referred to as Higher Winspeed sprayers. For these, criterion (c) is relaxed as that windspeeds up to (and including) 12 knots (or 14 mph) are included.

It must be remembered that the criteria were developed as a basis for comparative analysis and cannot be regarded as suitable for all types of equipment, chemical, soil, crop etc. They are also based on the conditions at about the time of spraying and no consideration is given as to the condition or growth stage of the crop, weed, fungus, pest etc. to which the spray is to be applied.

3. Spray Occasions 1981-82

3.1 Conventional Vehicles

The numbers of spray occasions are given in table 1a and the difference from average (for 1971-80) in table 2a.

3.1.1 Summer 1981

In June conditions were generally below or well below average.

The same comment applies broadly to July although conditions were rather above average at Waddington and about average at Elmdon, Honington and Gatwick. By contrast there were considerably more spraying occasions in August at all stations and several gave the highest values recorded in the 1970-81 period.

3.1.2 Autumn 1981

In September conditions were above average in the north and east and below average in the west and south. At Aberporth there were only 5 occasions. By October, which was well below average (particularly in the southern half of England) there were no occasions of significance except locally at Leeming and Elmdon.

November was better than is expected at several stations in England and Wales though no station had more than 4 occasions.

3.1.3 Winter 1981/82

There were no spray occasions in December and January. In February there were just a few at the stations in Scotland and the north of England.

3.1.4 Spring 1982

In March there were rather more occasions than normal and with a few exceptions in Scotland, and at Aldergrove, Aberporth and Mount Batten this situation continued through until June. In April and May, Elmdon and Waddington recorded an exceptionally high number of occasions.

3.2 Low Ground Pressure vehicles

Detailed figures are given of the number of occasions in table 1b and the difference from the mean for 1971-80 in table 2b. Table 3 summarises for the UK as a whole the benefit that would have been gained by using a Low Ground Pressure vehicle rather than a Conventional vehicle.

As is normal, these vehicles benefitted from the conditions between September and March. Conditions this season were particularly favourable in October (which was generally wet) with an additional 7 to 18 spray-occasions over Conventional vehicles; even so the number of occasions was still below average almost everywhere.

3.3 Higher Windspeed Sprayers

Over the UK as a whole systems benefitted over Conventional sprayers (assuming a Low Ground Pressure vehicle was used in both instances) much as average. The figures averaged over the UK are given in table 4.

4. April/May 1982 - How favourable?

Analyses are available for most stations from 1970 and show that the totals for April and May together are above the mean for the period at all stations. At Rhoose, Elmdon and Boscombe Down the totals are the highest of the period 1970 to 1982 whilst at Waddington the total is the highest of the 32 years since analyses started in 1951. For the latter period Mount Batten and Aldergrove recorded the 7th and 12th best years respectively.

It is also worth noting that, since 1973 at stations in England and Wales, the total for April and May has been consistently higher in 'even' years than the preceeding or suceeding 'odd' years. This situation could continue for a few years.

5. Conclusion

There was considerable variation form month to month in the number of spray-occasions in the period from June 1981 to December 1981. However from September to November there were fewer occasions than normal at many stations. From March to June 1982 there were consistently more spraying-occasions at most stations.

The gains to be had from use of Low Ground Pressure or Higher Windspeed sprayers were mostly much as normal except that in October 1981 Low Ground Pressure vehicles benefitted rather more than normal.

Acknowledgement

The author thanks R D'Costa at the Meteorological Office, Bracknell for running the computer programs to produce the analyses for 1981/82.

References

Adams, R.J. (1980). Towards an objective method of categorising a given season in terms of suitability for spraying with special reference to the 1978-9 season. BCPC, 16th Review of Herbicide Usage 1979.

Adams, R.J. (1981). 'Spray Days' Analysis - July 1979 to June 1980. BCPC, 17th Review of Herbicide Usage 1980.

Spackman, E.A. and Barrie, I. (1981). Spray occasions determined from Meteorological Data during the 1980-81 season at 15 stations in the UK and comparison with 1971-80. Agricultural Memorandum No 933. (Unpublished paper available from National Meteorological Library, Bracknell) also available in BCPC, 18th Review of Herbicide Usage 1981.

Note: The BCPC Herbicide Reviews are only available to member organisations of BCPC.

Table 1: Number of Spray Occasions

a) Conventional vehicle

	1981							1982					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kinloss	14	15	26	20	0	0	0	0	5	4	11	27	19
Turnhouse	20	17	28	18	1	0	0	0	2	9	21	24	17
Aldergrove	8	16	29	10	0	0	0	0	0	9	26	13	23
Leeming	11	14	32	18	3	4	0	0	3	11	22	26	27
Aberporth	16	18	36	5	1	2	0	0	0	10	25	18	21
Rhoose	19	16	32	11	0	0	0	0	0	9	27	23	22
Shawbury	13	21	37	19	0	2	0	0	2	9	27	33	29
Elmdon	16	27	41	15	4	4	0	0	0	8	36	36	27
Waddington	17	33	37	22	0	3	0	0	0	11	30	30	27
Honington	11	24	41	22	0	1	0	0	0	10	20	30	29
Stansted	15	23	44	25	0	4	0	0	0	10	21	27	22
Mount Batten	22	11	46	15	0	3	0	0	0	10	20	17	17
Boscombe Down	13	21	45	18	0	3	0	0	0	10	19	24	27
Gatwick	22	29	46	22	0	0	0	0	0	14	22	26	25

b) Low Ground Pressure vehicle

	1981							1982					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kinloss	14	15	26	25	8	3	0	5	10	6	11	27	19
Turnhouse	20	17	28	19	12	3	1	4	7	13	21	24	22
Aldergrove	10	16	29	13	10	7	0	0	3	13	26	13	24
Leeming	11	14	33	19	12	8	0	2	6	11	22	26	30
Aberporth	16	18	36	7	8	3	2	1	1	13	25	18	22
Rhoose	20	16	32	16	12	9	2	3	2	15	28	23	22
Shawbury	15	21	39	21	15	9	1	5	7	14	27	33	31
Elmdon	18	27	42	24	18	9	1	6	6	15	36	36	29
Waddington	19	33	43	22	18	6	0	2	4	20	30	30	29
Honington	11	24	41	22	14	10	1	2	7	19	20	30	30
Stansted	17	23	46	29	12	10	1	4	6	16	21	27	26
Mount Batten	22	11	46	16	10	9	6	4	3	12	20	17	20
Boscombe Down	14	21	46	24	10	9	2	2	2	14	19	24	29
Gatwick	24	29	49	25	15	11	1	7	7	18	22	26	25

Table 2: Number of Spray Occasions: difference from average for 1971–80

a) Conventional vehicle

	1981							1982					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kinloss	–2	–3	+5	+9	–8	–1	0	0	+4	–1	–3	+11	+3
Turnhouse	+3	–5	+4	+4	–6	–1	0	0	+2	+4	+6	+6	0
Aldergrove	–10	–4	+7	+1	–4	0	0	0	0	+6	+9	–5	+5
Leeming	–8	–10	+7	+1	–7	+3	0	0	+2	+7	+6	+8	+8
Aberporth	–7	–5	+12	–9	–3	+2	0	0	0	+6	+10	–3	–2
Rhoose	0	–4	+10	–4	–6	–1	0	0	0	+5	+12	+5	+3
Shawbury	–11	–6	+7	–2	–12	0	0	0	+2	+4	+10	+10	+5
Elmdon	–6	+1	+13	–7	–9	+3	0	0	0	+2	+19	+17	+5
Waddington	–5	+6	+13	+4	–10	+2	0	0	0	+8	+16	+13	+5
Honington	–11	+1	+15	+2	–11	–1	0	0	–1	+3	+8	+13	+7
Stansted						n/a							
Mount Batten	+3	–13	+24	0	–8	–2	0	0	0	+4	+6	–1	–2
Boscombe Down	–7	–4	+20	0	–9	+1	0	0	0	+5	+7	+8	+6
Gatwick	–2	0	+16	–1	–12	–2	0	0	–1	+7	+6	+8	+1

b) Low Ground Pressure vehicle

	1981							1982					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kinloss	–2	–3	+3	+12	–4	–1	–2	+4	+4	–2	–5	+11	+13
Turnhouse	+3	–5	+3	+3	–3	–1	–1	+3	+3	+3	–4	+6	+5
Aldergrove	–10	–6	+3	–3	–3	+3	–2	+2	–3	+3	+5	–6	+4
Leeming	–8	–9	+5	0	–5	+3	–2	+1	+1	+2	+5	+7	+11
Aberporth	–3	–7	+11	–9	0	+1	–1	0	–3	+6	+7	+4	–2
Rhoose	0	–7	+8	–4	–2	+2	0	+1	+4	+4	+10	+4	+2
Shawbury	–10	–7	+7	–3	–5	+2	–3	+2	–1	+2	+8	+9	+6
Elmdon	–5	0	+12	0	–2	+3	–2	+4	0	+4	+20	+17	+6
Waddington	–3	+4	+16	+2	+3	+3	–1	+1	–1	+11	+13	+12	+7
Honington	–11	0	+14	0	–4	+5	–1	+1	+1	+8	+6	+13	+8
Stansted	–11	–5	+17	+3	–7	+3	–3	+1	0	+3	+4	+7	+1
Mount Batten	+2	–13	+22	–4	–2	+2	+1	0	–5	+1	+5	–2	0
Boscombe Down	–7	–4	+20	+4	–5	+2	–1	0	–3	+4	+5	+7	+8
Gatwick	–2	–1	+18	–4	–5	+3	–3	+4	–1	+4	+3	+7	–1

Table 3: Number of occasions gained (averaged over 14 stations) by using a Low Ground Pressure vehicle rather than a Conventional vehicle. Value in brackets is difference from average for 1971–80

1981							1982					
Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1 (0)	0 (−1)	1 (−1)	3 (0)	12 (+5)	6 (+2)	1 (−1)	3 (+1)	4 (−2)	5 (0)	0 (−2)	0 (−1)	1 (0)

Table 4: Number of occasions gained (averaged over 14 stations) by using a sprayer capable of operating in higher windspeeds over a Conventional sprayer – both systems using a Low Ground Pressure vehicle. Value in brackets is difference from average for 1971–80

1981							1982					
Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
8 (−1)	10 (+1)	6 (−2)	7 (0)	5 (−1)	3 (+2)	1 (0)	2 (+1)	3 (+1)	4 (0)	10 (+3)	8 (0)	7 (2)